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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,213	08/21/2006	Michelle D. Griglione	GRIGLIONE 5	1211

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EXAMINER	
LIU, BENJAMIN T	

ART UNIT	PAPER NUMBER
2893	

NOTIFICATION DATE	DELIVERY MODE
11/17/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/598,213	GRIGLIONE, MICHELLE D.	
	Examiner	Art Unit	
	Benjamin Tzu-Hung Liu	2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 August 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/21/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 19-33 in the reply filed on 8/25/08 is acknowledged.

Specification

2. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware of in the specification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 19-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozkan (6,437,376) in view of Kuper (3,725,161).

With regard to claim 19, figures 1-3 of Ozkan et al. discloses a heterojunction bipolar transistor ("HBT") comprising: a collector 12; a base 16 disposed above the collector 12, the base 16 comprising a silicon-germanium layer ("silicon germanium"); and an emitter 46 overlying the germanium-enriched region "germanium content". Abstract.

Ozkan does not disclose a germanium-enriched region proximate an upper surface of the base and within the silicon- germanium layer.

Never the less, Kuper discloses a germanium-enriched region ("increased concentration of one of the elements, e.g. germanium, at the interface and in the subsurface") proximate an upper surface of the base and within the silicon- germanium layer. Col 1 lines 15-20.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 20, figures 1-3 of Ozkan discloses the limitation, wherein the germanium- enriched region "germanium content" creates a band-gap differential between the emitter 46 and the base 16. Col 1 lines 24-26.

With regard to claim 21, figures 1-3 of Ozkan discloses the limitation, wherein carrier mobility is greater ("reduces the majority carrier transit time") in the germanium-enriched region ("germanium content") than in the base 16. Col 1 lines 27-29.

With regard to claim 22, figures 1-3 of Ozkan discloses the limitation, wherein the germanium- enriched region ("germanium content") comprises a strained germanium-enriched region ("lattice mismatches"). (The lattice mismatch of the germanium enriched region with the rest of the silicon germanium would create a strained germanium region) Col 1 line 32.

With regard to claim 23, Ozkan discloses all the subject matter claimed except for the limitation, wherein a germanium concentration in the germanium-enriched region ranges from about 30 percent to about 75 percent.

Never the less, Kuper discloses the limitation, wherein a germanium concentration in the germanium-enriched region ("Ge") ranges from about 30 percent to about 75 percent ("36.5 atom percent Ge"). Col 7 line 56.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 24, figures 1-3 of Ozkan disclose the limitation, wherein a germanium concentration is greater ("20%") in the germanium-enriched region than in the silicon-germanium layer 16. Col 4 line 22.

With regard to claim 25, Ozkan discloses all the subject matter claimed except for having a valence band offset of greater than about 0.21 eV.

Never the less, Kuper disclose a valence band offset of greater than about 0.21 eV ("36.5 atom percent Ge"). Col 7 line 56.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization

coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 26, figures 1-3 of Ozkan disclose the limitation, wherein the germanium- enriched region ("germanium content") has a relatively low level of lattice defects ("prevent defects"). Col 1 line 67.

With regard to claim 27, figures 1-3 of Ozkan disclose the limitation, wherein the base comprises a graded ("graded") doped silicon-germanium base 16 or a stepped doped silicon-germanium base. Col 4 line 32.

With regard to claim 28, Ozkan disclose the limitation, wherein the base 16 comprises a uniformly doped silicon-germanium base ("box profile"). Col 5 line 20.

With regard to claim 29, Ozkan discloses all the subject matter claimed except for the limitation, wherein the germanium- enriched region is in contact with the emitter.

Never the less, Kuper discloses the germanium-enriched region is at the interface and in the subsurface of the alloy of silicon and germanium. Col 1 lines 11-19.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 30, Ozkan discloses all the subject matter claimed except for the limitation, wherein a concentration of germanium in the germanium-enriched

region decreases abruptly from a concentration proximate the upper surface in a direction toward the collector.

Never the less, Kuper discloses the limitation, wherein a concentration of germanium in the germanium-enriched region ("Ge-rich regions") decreases abruptly from a concentration proximate the upper surface in a direction toward the substrate. Col 12 line 26.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 31, figures 1-3 of Ozkan discloses a bipolar junction semiconductor comprising: a silicon substrate; a collector 12 disposed in the substrate; a base 16 disposed overlying the collector 12, wherein the base 16 comprises a silicon-germanium ("silicon germanium") portion; a germanium-enriched region ("Ge content") formed in the silicon-germanium portion 16, and an emitter 46 disposed overlying the germanium-enriched region ("Ge content"). Col 4 lines 15-25.

Ozkan does not disclose the limitation, wherein a concentration of germanium ("Ge") in the germanium-enriched region is substantially greater than the concentration of germanium in the silicon-germanium portion.

Never the less, Kuper discloses the limitation, wherein a concentration of germanium ("Ge") in the germanium-enriched region is substantially greater than the concentration of germanium in the silicon-germanium portion.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 32, Ozkan discloses all the subject matter claimed except for the limitation, wherein the germanium- enriched region comprises a thermally oxidized enriched region.

Never the less, Kuper discloses the limitation, wherein the germanium- enriched region "increased concentration of one of the elements, e.g. germanium, at the interface" comprises a thermally oxidized "oxidized coating" enriched region. Col 1 lines 11-18.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

With regard to claim 33, Ozkan discloses all the subject matter claimed except for the limitation, wherein the germanium enriched region includes at least a 30% germanium concentration.

Never the less, Kuper discloses the limitation, wherein the germanium enriched region includes at least a 30% germanium concentration "36.5 atom percent Ge". Col 7 line 57.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device of Ozkan with the limitation of Kuper in order insert Ge-rich regions by this process to utilize properties such as different mobility, energy gap, ionization coeffcients, thermal conductivity, stress-moduli, potential barrier-heights in metal-semiconductor configurations, and dielectric constant. Col 12 lines 25-30 of Kuper.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin Tzu-Hung Liu whose telephone number is (571)272-6009. The examiner can normally be reached on Mon-Fri 9:30 AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571 272 1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BTL
7/24/2008

/Davienne Monbleau/
Supervisory Patent Examiner, Art Unit 2893